

Amended Claim 1 recites, inter alia, first detection means for detecting the angle of the image pickup direction and for determining whether the detected angle equals a predetermined angle, and storage means for storing an image signal of one or more subjects only when the predetermined angle is detected by said first detection means. Amended Claim 10 is a method claim which recites substantially similar features.

Amended Claim 7 recites, inter alia, image pickup direction switching means for switching the image pickup direction of the image pickup means between a direction for picking up an image of the subject laid on a mount table and another direction. Detection means detects the image pickup direction of the image pickup means and storage means stores the image signal output by the image pickup means only when the image pickup direction detected by the detecting means is the direction for picking up the subject on the mount table.

As understood by Applicant, Ishiyama shows an image pickup means having a photo-interrupter and a movable member whose movable range is regulated by a pin, a direction detector that detects the direction of image pickup means and an image memory that stores pixel data. An image inversion signal is provided when the direction detector detects the image pickup means is directed to a certain direction.

In Ishiyama, image memory 27 stores and outputs image signals at all times. When the image is to be

inverted, i.e., displayed so that the image picked up in an original image pickup mode does not appear upside-down, the image data is read out from the image memory in an order opposite to which it is written to the image memory. At all other times, that is, when no inversion is to effected, the image data is read out in the same order as it is written. (See [0055] to [0057] in attached English translation of Ishiyama.)

Applicant fails to find in Ishiyama any teaching or suggestion of the storage means storing an image of one or more subjects only when detecting means detects that the image pickup part is directed to a predetermined angle, as in amended Claims 1 and 10, or only when it is detected that the image pickup direction of the image pickup means is the direction for picking up the subject on the mount table, as in amended Claim 7. Accordingly, amended independent Claims 1, 7 and 10 are believed to distinguish patentably over Ishiyama.

Each of newly added independent Claims 14, 23 and 28 recites, inter alia, storing image signals when a predetermined angle has been detected (Claims 14 and 28) or when the image pickup direction of the image pickup means is the direction for picking up the subject on the mount table (Claim 23), and that the output of the stored image signal is controlled at an arbitrary timing (e.g., by pushing memory switch 300).

As mentioned above, Ishiyama shows controlling of inversion of an output image in accordance with a detected image pickup direction. In Ishiyama, the order of writing pixel data to image memory 27 is determined in accordance with the image pickup direction. When the writing of the pixel data for one frame is completed, the pixel data is read in a predetermined order based on the predetermined reading-request signal from reading-request generator 32. Since pixel data is always output from image memory 27 in real time, Applicant submits that it would not be possible to control the output timing of pixel data optionally, that is, at an arbitrary timing, as in Claims 14, 23 and 28. Accordingly, those claims are believed to distinguish over Ishiyama.

A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration, or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 758-2400. All correspondence should continue to be directed to our address given below.

Respectfully submitted,


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Inventors: Ishiyama, et al.

Applicant: Sharp Corporation

[Title of the Invention] IMAGE INVERTER

[Abstract]

[Object] In a subject-copy image-pickup mode, to automatically erect an image and display it.

[Construction] In a camera 1 there is provided a direction detector 14 for detection of direction. In a subject-copy image-pickup mode, a photo-interrupter 13 is switched on, and an image inversion signal becomes at high level. Horizontal-direction and vertical-direction address counters 29, 30 are used as down-counters, in which the order of writing pixel data to an image memory 27 is written in reverse to the order of reading from the image memory 27. In a normal image-pickup mode the photo-interrupter 13 is switched off, and the image inversion signal becomes at low level. The horizontal-direction and vertical-direction address counters 29, 30 are used as up-counters, in which the order of writing the pixel data to the image memory 27 is written in the same order as the order of reading from

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the image memory 27.

[0023] According to the embodiment, the switching of the modes, namely, control of projecting the erected and inverted images 7 is performed by the direction detector 14. The structure of the direction detector 14 will be described below, with reference to Fig. 2 to Fig. 5.

[0055] In the subject-copy image-pickup mode the order of writing the pixel data to the image memory 27, and the order of reading the pixel data from the image memory 27 are opposite. Thus, on the liquid-crystal display 4 an image inverted with respect to the image captured by the camera 1 is displayed. As a result, on the liquid-crystal display 4 the image is displayed as an erected image.

[0056] According to the embodiment, in the camera 1 there is provided the direction detector 14 for detecting the direction of the camera 1, comprising the photo-interrupter 13 and the movable member 14a whose movement amount is limited by the movement-limit pin 24. In the subject-copy image-pickup mode the photo-interrupter 13 is switched on, and the image-inversion signal becomes at high level. Thereby, the horizontal-direction address counter 29 and the vertical-direction address counter 30 are used as down counters, in which the order of writing the pixel data to the image memory 27 is written in reverse to the order of reading the pixel data from the image memory 27. When the

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writing of the pixel data for one frame is completed, the pixel data is read in predetermined order based on a predetermined reading-request signal, and the read data is converted by the D/A converter 28 into analog video signals, which are projected on the liquid-crystal display 4. In the case of the subject-copy image-pickup mode, the order of writing the pixel data and the order of reading the pixel data are opposite. Thus, on the liquid-crystal display 4 the projected image is displayed as an erected image.

[0057] In addition, in Fig. 5, in the normal image-pickup mode the photo-interrupter 13 is switched off, the image-inversion signal becomes at low level. Thereby, the horizontal-direction address counter 29 and the vertical-direction address counter 30 are used as up-counters, in which the order of writing the pixel data to the image memory 27 is written in the same order as the order of reading the pixel data from the image memory 27. When the writing of the pixel data for one frame is completed, the pixel data is read in predetermined order based on the predetermined reading-request signal, and the read data is converted by the D/A converter 28 into analog video signals, which are projected on the liquid-crystal display 4. In this case the order of writing the pixel data to the image memory 27, and the order of reading the pixel data from the image memory 27 are identical. Thus, on the liquid-crystal

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display 4 the same erected image as the image captured by the camera 1 is displayed.

[0058] Accordingly, characters on the subject copy 6 can be automatically projected as an erected image. Switch operation for inverting the image is not necessary, which facilitates the device operation.

FIG. 1

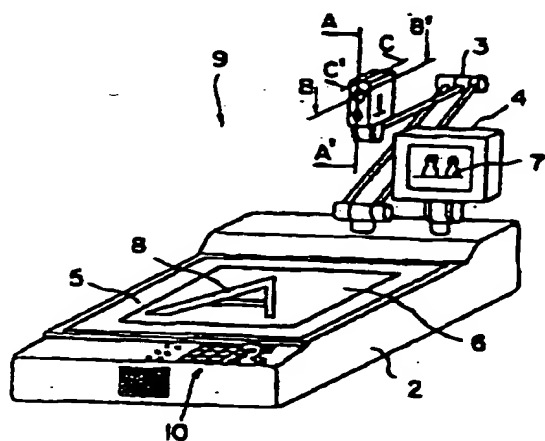


FIG. 2

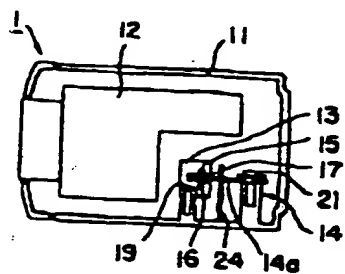


FIG. 3

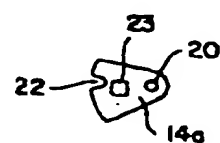


FIG. 4

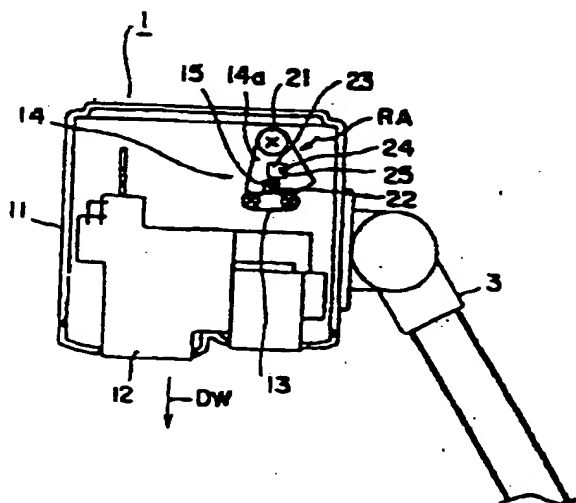


FIG. 5

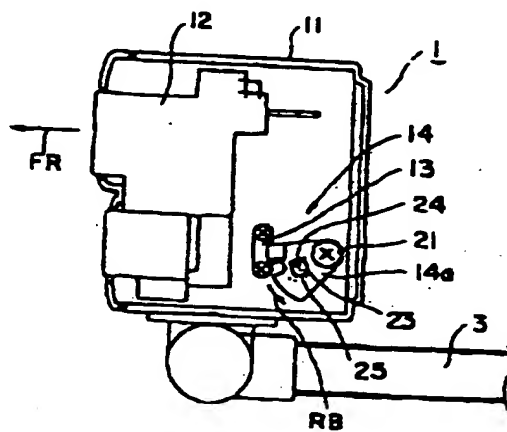


FIG. 6

